University of Rwanda College of Science and Technology School of Applied Sciences Electrical and Telecommunication: Year 2 Semester 2

MAT 3221 Engineering Mathematics 4-Set 2

1. Evaluate the following integral

$$\int_0^4 (1 - e^{-2x}) \, dx$$

- (a) analytically,
- (b) single application of the trapezoidal rule,
- (c) single application of Simpson's 1/3 rule,
- (d) For each of the numerical estimates, determine the percent relative error based on (a).
- 2. Use Euler's method to find an approximate solution to

$$y' = y - t^2 + 1, \quad 0 \le t \le 2,$$

 $y(0) = 0.5$

with h = 0.2.

- 3. Use Taylor's method of order 2 and 4 to problem (2).
- 4. Apply the Runge–Kutta method of order 2 to the problem (2).